

ARNOLD ARBORETUM
HARVARD UNIVERSITY



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BREEDING NEW VARIETIES OF ORNAMENTAL
CRABAPPLES AT THE ARNOLD ARBORETUM

DURING the past few years the Arboretum has started rather extensive experiments in the breeding of ornamental trees and shrubs. One of the objectives is the possibility of thus obtaining new plants which may be desirable from an ornamental standpoint. To perhaps attain this objective, a large number of seedlings must be grown from which to make selections. Since nursery space at the Arboretum is limited, we cannot carry through all of these seedlings to maturity and, hence, plan to "farm out" these plants to interested individuals who have space in which to grow them. The ornamental crabapples were selected because of their high ornamental value and the interesting genetic problems connected with their breeding. Approximately 2000 seedlings will be distributed next spring to individuals and institutions requesting them, and it is to acquaint those who may be interested with some of the facts concerning this work that this bulletin is issued.

It is desirable from our standpoint that plantings be made in regions reasonably convenient to Boston so that at the proper season we may have the privilege of examining the growing stock. They will, of course, all represent unnamed seedlings, but it is expected that some of them will present features of special horticultural interest and it may later be desirable to perpetuate some of these by asexual propagation methods.

As a rule the breeding of new varieties of plants is done by artificial cross pollination, but in the case of apples and cherries the plants are largely self-sterile so that under proper conditions hybrids are produced naturally. It has long been known that apples are partially or completely self-sterile and must be cross pollinated to produce fruit and

set seeds. Trees of a clonal variety are inter-sterile so that in commercial orchards different varieties must be planted together to insure proper pollination. The cross pollination is effected largely by bees, and in many of the large western orchards hives of bees are distributed through the orchards at blooming time. In New England the bumble bees play an important part in orchard pollination.

The species of ornamental crabapples also are self-sterile and must be cross pollinated in order to produce seeds. In the Arnold Arboretum these species and varieties are represented by single specimens as a rule so that the seed produced by a single tree is the result of pollination by the other trees in the vicinity. Consequently, the seedlings produced by such a collection of species must be hybrids. There is some limitation on crossing because the flowering periods of the Asiatic and American species do not overlap and as a consequence crossing is restricted to species within these two groups growing in the Arnold Arboretum.

Seeds from species of crabapples were collected in the fall of 1938 and were planted in flats. Young plants were grown in the greenhouse until they could be set out in the nursery plots in May. Most of these seedlings are now from 2 to 4 feet tall and can be transplanted next spring.

There are over 3,000 trees in the nursery representing the progeny of 50 species and varieties. As expected most of the seedlings from any species vary greatly in growth habit, leaf shape, and color, indicating that they are of hybrid origin. Some of the parental trees were known to be of hybrid origin so that their progeny should vary even if pollination were limited to a single male parent.

Among these crabapple species two produce only the parental types. These species, *Malus hupehensis* (theifera) and *M. toringoides*, are parthenogenetic and produce seed asexually without pollination. These species fortunately are among the best of the flowering crabs, and can be reproduced by seed regardless of their association with other species. A few of the other species show little segregation, but most of them produce seedlings which are extremely variable.

Among the seedlings from the Arboretum collections there are many dwarfs, a few prostrate or weeping types, and many variations in leaf shapes and colors. Some have dark purple foliage all summer long while others have color only in the fall. A few are very large and vigorous and may have possibilities as root stocks for orchard trees.

It is hoped that many of the new combinations of species will produce varieties of horticultural value. Types with attractive flowers,

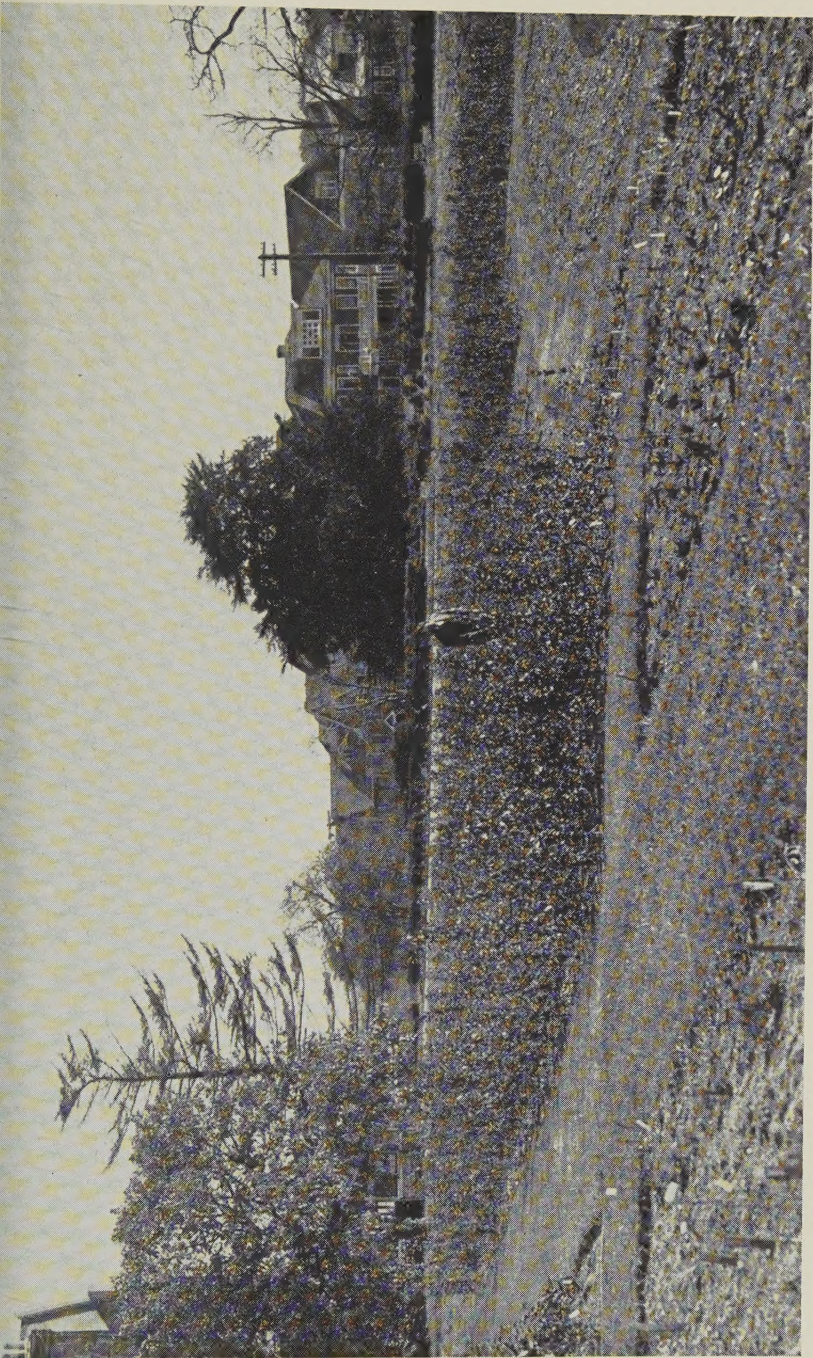


PLATE X

Seedling Crabapples at the Arnold Arboretum After Their First Year of Growth.
These are the seedlings, 2 to 4 feet tall, which will be distributed in the spring of 1940.

ornamental fruits and graceful growth habits will be selected as the trees mature. The Arboretum now has several acres of nursery space where many crabapple, lilacs, cherry, and rose seedlings will be grown to the flowering stage.

There will be a considerable number of crabapple trees which we cannot handle at the Arboretum and we hope that about 2,000 of these seedlings can be placed on private grounds or estates. We plan to distribute our surplus stock next spring to individuals who will care for the young plants. If any particular orphan tree should prove to be of exceptional value, the Arboretum reserves the right to obtain propagating stock from it so that the variety can be more widely distributed.

The surplus apple seedlings will be distributed in the spring of 1940. Most of them should be of ornamental value and some should be new and unusual types. Those interested in growing some of these hybrids should send their request to Dr. Donald Wyman, at the Arboretum, and indicate the number of seedlings desired. Because of the hybrid nature of these seedlings, as explained above, the color of flowers and fruit cannot be foretold. The plants will be delivered simply as crabapple seedlings. However, since all have been grown from seed collected in the Arboretum where the best ornamental species are grown, a large number should be of distinct ornamental value. It is understood that, in most cases, the prospective grower will obtain the young trees at the Bussey Institution greenhouse at a time to be indicated later, and see that the trees are properly planted and cared for.

GEORGE W. SKIRM

CONDITIONS UNDER WHICH CRABAPPLE SEEDLINGS
MAY BE OBTAINED

1. Each seedling must be carefully planted and given normal care thereafter. They become the property of the person or institution obtaining them.
2. Arboretum staff members will have the privilege of inspecting these seedlings occasionally from time to time.
3. The Arboretum reserves the right to take propagating material from any tree which proves to be of exceptional value.
4. The plants will be prepared for shipment by the Arboretum but recipients are expected to make arrangements for their delivery from the Bussey Institution greenhouse, South Street, Jamaica Plain, at a time to be indicated later.
5. Because of the hybrid origin of these trees, color of flower, fruit, etc., cannot be foretold; consequently they will be distributed simply as unnamed seedlings, originating in the Arnold Arboretum.